


1068470 - R8 SDMS

**INTERIM MEASURES WORK PLAN
EAST HELENA FACILITY**

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VOLUME II – CORRECTIVE ACTION MANAGEMENT UNIT (CAMU) DESIGN REPORT

**RESPONSE TO EPA COMMENTS
ON INTERIM MEASURES WORK PLAN
EAST HELENA FACILITY**

GENERAL COMMENTS

General Comment 1. The IM process should remain a flexible, iterative process for the development, evaluation, and implementation of corrective measures at the facility. This is particularly pertinent as new information is gathered on subsurface soil and groundwater conditions in the Acid Plant and Speiss Handling area of the site. Depending upon the results of proposed sampling in these areas, EPA may require additional or supplemental IM Work Plans to develop and evaluate interim measures for groundwater or subsurface soil in these specific areas.

Response: Asarco recognizes that there may be a continuing need to evaluate and implement interim measures, as appropriate, based on supplemental information. However, many potential measures may more appropriately be part of the RFI process. Asarco will continue to work with EPA in evaluating the most appropriate remedial measures for the East Helena Plant Site.

General Comment 2. The basis for using only the toxicity characteristic leaching procedure (TCLP) criteria to determine what portion of the Lower Lake Sediments and Other Stockpiled Soils to be placed in the Corrective Action Management Unit (CAMU) needs to be reevaluated. TCLP is used to define whether a substance is RCRA hazardous waste. However, soil that does not meet the TCLP threshold might still pose a significant threat to human health or the environment. For the stockpile soils interim measures, it is recommended that all waste in the area that poses a risk to onsite receptors or groundwater be placed in the CAMU or non-hazardous material containment cells in the CAMU.

Response: The work plan calls for placing all of the Lower Lake sediments and all stockpiled soils in the CAMU. TCLP sampling will be used to further characterize these soils prior to placing them in the CAMU. The only location where the disposition of the soils has not been determined is Shew Ridge. As discussed in response to Comment 4 on Appendix A, site data do not indicate that Shew Ridge soils pose a significant threat to human health or the environment. The need for disposal of non-hazardous material in a separate containment cell will be established during subsequent phases of the RFI investigation. The text of work plan will be revised to clarify this issue.

General Comment 3. In many places in the IM Work Plan, the CAMU Design Report is referred to as being found in Appendix B. The CAMU Design Report is Volume II of the IM Work Plan.

Response: A reference to Volume II had been added to clarify the text.

SPECIFIC COMMENTS

Specific Comment 1. Page 2-7, Bullet 1. A statement should be added to this bullet that groundwater arsenic concentrations also exceed the State of Montana's WQB-7 human health based standard of 0.02 mg/l.

Response: The text has been revised accordingly.

Specific Comment 2. Table 3-1-2, GW-2A. While private well owners are connected to public drinking water supply, there is no documentation that existing private wells are sealed or that there is a well ban. There should be a well ban in East Helena and existing private wells in the arsenic plume should be accessible only for groundwater

sampling. If this is not the current situation, a means for implementing these activities must be developed.

Response: Privately owned wells have been monitored as part of the RI/FS and post-RI/FS monitoring since 1984. Based on information obtained as part of the RI/FS, as part of the long-term monitoring program, and as part of EPA's CERCLA activities, none of the private wells in East Helena are used for domestic potable (drinking) water supplies. Most (if not all) of the residential wells in East Helena have been disconnected from house plumbing and residential water is supplied by the city. However, a few residences use their wells for yard irrigation purposes. Water is pumped directly from the well to a yard hydrant and used for lawn irrigation.

With the exception of one private well (St. Clair) none of the private wells are developed "in the arsenic plume." Water well drillers in East Helena target deep aquifers (deeper than 25 feet) to obtain sanitary water supplies that would not be affected by home septic systems. As a result, all the private wells (with the exception of the St. Clair well) are completed in intermediate or deep aquifers under East Helena. As shown in the CC/RA and the RI/FS, intermediate and deep aquifers do not have elevated arsenic concentrations.

The St. Clair well is the exception. This is an older well, apparently a "dug well" and, contrary to later well drilling practices, was completed in the shallow ("first water") water table aquifer. As a result, the St. Clair has shown low (0.008 to 0.144 mg/l) but notable arsenic concentrations. This well usually contains no pumping equipment. Because of its age, and unsanitary conditions (along with warnings provided by EPA CERCLA), it is not used by the resident, and samples that have been collected for monitoring purposes have been obtained using bailers or portable pumping equipment.

The City of East Helena presently has a well ban ordinance in place (see attachment). Ordinance No. 199 prohibits the drilling of a private well or reactivation of an existing inactive private well within the water service area of East Helena. This regulation applies

to both potable and non-potable uses including irrigation, manufacturing, commercial, non-commercial and human consumption. The survey of private wells conducted during the RI indicated that some of the private wells that remain in East Helena are still used on occasion by residents for lawn irrigation. While ongoing monitoring shows no elevated arsenic associated with the existing private wells in East Helena (with the exception of the St. Clair well as noted above), Asarco recognizes that it may be ultimately desirable to limit pumping activities in areas where there are elevated arsenic in the overlying shallow aquifer. Asarco will evaluate whether pumping activities are still active in these areas and if so, develop a plan to phase these uses out.

Specific Comment 3. Table 3-1-2, AP-1A, AP-2A, AP-2B. Provide an estimate of when this work will be complete.

Response: The schedule for implementation of spill reduction and containment measures for the acid plant area is discussed in Section 4.2 of the work plan and shown in the project schedule in Figure 7-1-2. As indicated in the schedule, Asarco has already begun implementation of these measures. Spill reduction and containment measures have been scheduled for 1999 in Areas 1, 4, 7, 8, & 9 (see Exhibit 1). The timing for implementation of specific measures in these areas is described below.

- Asarco completed all improvements shown on Exhibit 1 for Area 8 in May 1999.
- Area 4 improvements were completed in June 1999.
- Some portions of Area 7 have been completed. However, Asarco has modified their plans to relocate the rail car loadout, which will result in some additional paving of areas not originally proposed in the IM work plan. Exhibit 1 has been updated to show these modifications. The rail car relocation and associated paving will be completed in the year 2000.
- Work in Area 1 is underway with concrete work scheduled for completion in August 1999.

***Specific Comment 4.** Page 4-6, step 1. As part of the runoff containment and conveyance evaluation, the primary containment tank, secondary containment system, runoff input drains, and perimeter runoff trough drains will be cleaned of all sediment. Describe how Asarco will manage the sediment, including analysis, storage, smelting and disposal.*

Response: The primary tank, secondary containment system, runoff input drains, and perimeter runoff trough drains will be drained of existing water, and thoroughly cleaned using the plant vacuum truck to remove sediment. Any sediment removed from the containment tanks and drains will be managed following the procedures Asarco has established for routine maintenance and cleaning of these facilities. The speiss sediments will be placed on the concrete scrubber pad where any residual water will decant to a concrete lined containment sump. The decant water will then be routed to the HDS water treatment plant.

The remaining speiss solids will be removed from the concrete scrubber pad using a front end loader and transferred to the direct smelt building where the speiss will be mixed with other direct charge material and placed in the blast furnace for metals recovery. This description will be added to the text of the report.

***Specific Comment 5.** Page 4-10, Table 4-1-1. Table 4-1-1 shows the total depth of well DH-32 as 30 feet. Based upon text on page 4-14 (2nd paragraph), the total depth of this well should be 32 feet not 30 feet as indicated.*

Response: The table has been revised for consistency. It should be noted, however, that values presented in the table are approximations. The final completion depth will be determined in the field based on site stratigraphy and water table conditions.

Specific Comment 6. Page 4-12, Table 4-1-3. Table 4-1-3 shows the interim measures soil sample collection and analysis matrix. It is unclear what sample types and depth intervals apply for wells DH-45 through DH-47 and DH-48 through DH-54. The table should be revised as necessary.

Response: The table has been revised to clarify sample type and depths as indicated.

Specific Comment 7. Page 4-15, Figure 4-1-6. Figure 4-1-6 shows monitoring well construction details. This figure should be modified to indicate that well screen will be located below water table as stated on page 4-14.

Response: The report text requires clarification. The well screens will be completed across the water table not below the water table as presently indicated. The text, figures, and tables have been checked and revised for consistency.

Specific Comment 8. Page 4-25, Figure 4-1-9. This figure shows construction details of the proposed air sparging well and indicates a total depth of 60 feet. The maximum depth of the proposed monitoring well along the plant site north boundary is only 40 feet according to Table 4-1-1. The correct well depth should be verified and the figure revised, as necessary.

Response: The depth of the sparging well is different than the monitoring well referred to above because they are separate wells that serve different purposes. The monitoring well on the north plant boundary is intended to provide water quality data in the upper portion of the aquifer where the highest metals concentrations are typically encountered. The air sparging well will be completed at a greater depth to allow the air to disperse through the saturated zone and maximize the area of influence. Again, actual completion depths will be determined in the field based on site stratigraphy.

***Specific Comment 9.** Page 4-28, Groundwater Control. The proposed groundwater activities do not adequately address the portion of the plume under East Helena. Provide a discussion of possible alternatives for this portion of the plume and a discussion of the effect of the proposed activities on this portion of the plume.*

Response: The proposed interim actions do address the portion of the plume in East Helena. The proposed measures near the north end of the property boundary are technically and strategically located to intercept off-plant migration of the plume and enhance conditions that already occur down-gradient under East Helena to attenuate the plume. Implementation of additional measures in the city of East Helena are not practical for three reasons:

- 1) There are no immediate receptors in this area and no indication of further migration due to processes of natural attenuation in the aquifer.
- 2) There are no off-site interim measures that are likely to be practical or effective until source reduction measures are effectively implemented.
- 3) The proposed measures will address downgradient groundwater quality through reductions in the arsenic load in groundwater.

Since the RI was conducted, arsenic concentrations and plume extent have remained stable within East Helena with the exception of concentrations at monitoring well EH-60 near the plant site boundary. The work plan will allow for evaluation of source control and redox controls to limit further offsite migration of arsenic to these areas. Implementation of additional interim measures in the East Helena area are unlikely to be practical or effective at addressing the comparatively low arsenic concentrations that are present in East Helena groundwater. Groundwater recovery is not a viable interim measure as it would require capture of an extremely large volume of water, which would in turn accelerate off-site migration of arsenic and metals. Geochemical fixation of arsenic through redox controls, which is being evaluated for implementation at the plant boundary, is also unlikely to be effective in East Helena, because arsenic in groundwater is already in an oxidized state beneath East Helena due to effects from Prickly Pear

Creek. These redox processes are already effectively stabilizing the arsenic plume and preventing migration to outlying areas. The proposed interim migration controls target the area along the north plant boundary and will attenuate the source of arsenic to East Helena groundwater. In addition, placement of migration controls along the north boundary of the plant site allows flexibility in location and placement of the migration control points. This flexibility could not be achieved in the city of East Helena because of limitations on property access, existing land use and traffic concerns.

Interim measures which target the higher arsenic concentrations in plant site groundwater have the greatest potential to achieve load reduction and therefore, the most potential to improve downgradient conditions. The discussion in the text has been expanded to clarify this issue.

***Specific Comment 10.** Page 4-29, Section 4.1.2.1, Air Sparging Pilot Test. The text discusses the proposed air sparging pilot test. In order to clarify the location of the test, the first sentence should be modified to state "A site along the plant site north boundary with favorable geology and geochemistry will be selected for an air sparging pilot test".*

Response: The text has been modified accordingly.

***Specific Comment 11.** Page 4-30, first full paragraph. The reference to Section 3.1 and 3.2 in the text should be corrected to Sections 4.1 and 4.2.*

Response: The text has been modified accordingly.

***Specific Comment 12.** Page 4-44, Section 4.3.3.4, Montana Water Quality Act and Controlled Groundwater Areas. CAMU construction and operation activities could possibly trigger MPDES stormwater requirements. Brian Heckenberger of DEQ's Water*

Protection Bureau should be contacted at 444-5310 to determine what, if any, stormwater requirements apply during construction and operation of the CAMU.

Response: Asarco has reviewed the MPDES requirements with Brian Heckenberger at DEQ. A general permit for storm water associated with construction activities may be required since the area of disturbance during construction could potentially exceed 5 acres. The completed CAMU will not require an MPDES permit since storm water will be contained on site. An expanded discussion is included in Section 4.3.3.4 of the report.

Specific Comment 13. Page 4-45, Section 4.3.3.4, last paragraph. This paragraph states that a very small amount of leachate will be generated from the CAMU. It should be noted that the quantity of leachate that is generated initially is dependent upon weather conditions during waste placement. Rainfall during this work can result in a significant quantity of leachate being generated and provisions should be made to collect and dispose of this leachate.

Response: The analysis of leachate generation assumes that the material is being placed in the CAMU is fully saturated and thus represents worst case conditions. The predicted volumes of leachate are still small enough to be manageable through treatment in the on-site water treatment system or alternatively shipment to an off-site disposal facility. The need to handle large quantities of leachate can be avoided if the work is conducted during fair weather, which Helena's semiarid climate typically provides.

The text has been modified to describe proposed measures to handle leachate.

Specific Comment 14. Figure 7-1-2. Include the EPA review (green) time in the key.

Response: The figure has been modified as indicated.

RESPONSE TO EPA COMMENTS
APPENDIX A: QUALITY ASSURANCE PROJECT PLAN

GENERAL COMMENTS

General Comment 1. Data Quality Objectives. As stated in Section 1.4, Data Quality Objectives (DQO) and Criteria for Measurement, "The process is a series of planning steps designed to ensure that the type, quantity, and quality of environmental data used in decision making are appropriate for the intended use. The DQOs are then used to guide the overall sampling design." However, text in the same section states that "The use of a judgmental rather than probabilistic (random) sampling approach precludes the need for detailed statistical DQOs, therefore, the data quality objectives outlined below for the IM Work Plan focus on the qualitative aspect of the DQO process, with quantitative components included as appropriate." Not following the entire DQO process as outlined in the guidance could possibly generate a data set where the potential error is unknown. This could lead to decision errors as well as produce a data set that is not sufficient to meet project objectives. Further consideration is warranted regarding the quantitative components of the DQO process.

Response: The DQO process in accordance with the EPA guidance (EPA, 1993) is followed in the IM Work Plan. As described in the plan, all major elements of the DQO process are examined and applied to the sampling procedures described in the Work Plan and in the QAPP. Some of the statistical procedures presented as options in the EPA guidance to evaluate sample size and frequency are not applicable to the sampling needs addressed in the Work Plan. For example, selection of monitoring well locations is dependent on known site hydrogeology, site access, and the geometry of the existing plume and use of statistical processes for selection of monitoring wells using a random or systematic grid is not appropriate.

The statistical procedures are also not applicable for soil samples collected from Shew Ridge. The procedures presented in EPA guidance assumes some preliminary data are available to apply statistics to evaluate a sample program that can be compared against site action levels. However, there are no preliminary data available from Shew Ridge for statistical evaluations, and as noted by previous EPA comments (see General EPA Comment 2 above and Specific Comment 4 below) action levels for plant site soils have not been established. In addition, the ridge sampling approach is limited by the long narrow geometry of the ridge, the rocky materials in the ridge, and available access to drilling and excavation equipment. The plan presented in the IM Work Plan and the attached QAPP considers these factors as well as anecdotal information on adjacent stockpiles and ridge stockpile processes.

However, it should be noted that the data generated from execution of the IM Work Plan will be evaluated using statistical processes to evaluate data trend and help limit potential decision errors (see responses to Comments 4 & 5 on Sections 1.4.5 and 1.4.6 regarding limits on detection errors). Many of the statistical options presented in EPA guidance are applicable for evaluation of data trends and evaluation of potential measurement errors.

The first paragraph on page 1-8 (Section 1.4) is apparently confusing and will be modified to read: *"As noted in the DQO guidance, the DQO process may have both qualitative and quantitative aspects, with the relative emphasis placed on these two components being a function of the overall project scope and goals. The qualitative aspects encourage thorough planning of a field investigation, such that the purpose and objectives of data collection are well-defined prior to implementation of the plan. The quantitative aspect of DQOs involves statistical evaluation of preliminary data relative to action levels to design a sampling program and to control the possibility of making incorrect decisions."*

In the case of the IM Work Plan, specific areas of the Asarco East Helena plant have been targeted for soil groundwater and/or soil sampling to support development and monitoring of interim stabilization measures. Statistical design for the well drilling and

groundwater IM sampling program, and for the soil stockpile sampling program is not applicable. The groundwater sample program has been designed based on known site hydrogeology, site access and the geometry of the existing plume, and a statistically random or systematic sample approach is not appropriate for groundwater. The application of statistics for Shew Ridge soil samples and other stockpile soils is also not applicable because of the narrow geometry of the piles, the rocky nature of soils in the piles, and limitations of equipment access. As a result, the DQOs outlined below are based primarily on qualitative aspects of the DQO process with quantitative components included where applicable or appropriate."

SPECIFIC COMMENTS

Specific Comment 1. Page 1-1, Section 1.1. The names of the QA personnel should be added to the text. The relationship between the project manager and project supervisor should be defined in the text. Also, the text should be modified to indicate that the health and safety officer has the authority to stop all field activities until health and safety deficiencies have been corrected.

Response: The text has been modified as indicated.

Specific Comment 2. Page 1-2, Section 1.2.1., Problem Background (Plant History), 1st paragraph. The first sentence appears to be missing information. Please modify the sentence to read "The Asarco East Helena Plant (the Plant) was constructed ... for the purpose of processing ores from local mines."

Response: The text has been modified as indicated.

***Specific Comment 3.** Page 1-5, Section 1.3, Project/Task Description and Schedule, Bullets. An additional bullet item should be considered for Section 1.3, related to determining the volume of the CAMU based on the additional quantity of material estimated in the Shew Ridge stockpile.*

Response: An additional bullet has been added noting “Finalize the volume of the CAMU based upon soil stockpile volume surveys and soil quality analysis from Shew Ridge”.

***Specific Comment 4.** Page 1-11, Section 1.4.5. The text states that if a decreasing trend is observed then the interim action will be considered successful. Additional information should be added to the text on the length of time, number of measurements, and the statistical procedures that will be used to define the decreasing trend.*

TCLP is used to define whether a substance is a RCRA hazardous waste. It does not define whether the material poses an unacceptable risk to onsite receptors. All waste in the area that poses a risk to onsite receptors or groundwater should be placed in the CAMU. Since the facility is active and the proposed remedy is an interim action, action levels could be based on industrial risk-based concentrations for soil developed by EPA Region 3. Alternatively, an industrial worker risk assessment could be completed in accordance with applicable EPA guidance to define the soil removal action levels. The methodology presented in the Soil Screening Guidance: User's Guide (EPA July 1996, Publication 9355.4-23) should be used to calculate the soil levels that will be protective of groundwater. The lower of either the risk based concentration or the concentration protective of groundwater should be used as the action level from the interim measure.

Response: Regarding trend analysis, Asarco agrees that a statistical approach is helpful to define trends in water quality. The assessment of water quality trends will include statistical procedures to evaluate trend analyses and comparisons with upgradient concentrations, as appropriate and in general accordance with the DQO guidance (EPA,

1993). Additional detail will be added to the text describing the proposed statistical procedures to be used to define decreasing trends.

Regarding paragraph 2 of this comment, the need for developing risk-based cleanup concentrations as part of the interim measure work plan has not been established. On-site soil stockpiles are going to be placed in the CAMU. The majority, if not all, of Shew Ridge soils are expected to remain in-place since these were originally segregated as "clean soils." Exposure to any residual metals will be effectively managed through existing routine plant health and safety programs which preclude the need for additional risk-based evaluation. Access to on-site areas is restricted to facility workers with appropriate protection. This includes strict personal protection measures and regular biomonitoring for chemical exposure. Fugitive, wind-blown dust emissions are monitored through an extensive air monitoring program which has achieved compliance with air quality requirements, mitigating off-site risks.

The principal interim concern is therefore mitigating impacts to groundwater. A risk-based assessment may need to be examined if the interim measures investigation or subsequent RFI investigation identify residual soils as a significant source of arsenic and metals to groundwater. However, arsenic and metals are not elevated downgradient of Shew Ridge (see Figures 2-4-1 through 2-4-4), and therefore, a detailed risk-based assessment is not being developed as an interim measure.

Specific Comment 5. Page 1-11, Section 1.4.6. The text states that statistical procedures are unnecessary. However, statistical procedures are appropriate to define a decreasing trend in groundwater contamination. Analytical error and bias as well as the number of sampling locations and the frequency those locations are sampled will have large impacts in determining whether there is a decreasing trend. A complicating factor will be the effects that changes in the ambient hydrologic conditions (water level, recharge, and others) have on the measured arsenic concentrations.

Response: See response to comment 4 above. Asarco agrees that a statistical approach can be used to define trends in water quality and has revised the work plan accordingly.

Specific Comment 6. Page 1-12, Section 1.6, Documentation and Records. This section discussed data reporting procedures. The text is not clear that additional information related to sample handling and custody requirements is located elsewhere in the document. Section 1.6 should state that additional information on documentation and records is found in Section 2.3.

Response: The text has been modified as indicated.

Specific Comment 7. Page 1-12, Section 1.6, Documentation and Records, 4th paragraph. The incorrect verb tense is used in the 2nd sentence. The sentence should read "No raw data are required."

Response: The text has been modified as indicated.

Specific Comment 8. Page 2-2, Table 2-1. This table is the same as Table 4-1-3 and shows the interim measures soil sample collection and analysis matrix. It is unclear what sample types and depth intervals apply for wells DH-45 through DH-47 and DH-48 through DH-54. The table should be revised as necessary.

Response: The table has been modified to clarify sample types and depth intervals for wells DH-45 through DH-47 and DH-48 through DH-54.

Specific Comment 9. Page 4-1, Section 4.1, Data Review, Validation, and Verification Requirements, 5th paragraph. The incorrect verb tense is used in the 3rd sentence. The sentence should read “As no raw data are required, data validation will include a check on ... matrix spikes.”

Response: The text has been modified as indicated.

RESPONSE TO EPA COMMENTS

CAMU DESIGN REPORT - VOLUME II

GENERAL COMMENTS

General Comment 1. The CAMU Design Report is concise and well-written. In general, the design requirements and design criteria are well documented. The proposed landfill will comply with the requirements for a hazardous waste landfill as defined in 40 Code of Federal Regulations (CFR) 264.

Some additional documentation is required, as described in the specific comments below. Specifically, additional information is required regarding the proposed use of existing soil for the underlying clay liner. The Design Report assumes that the existing soil can be modified to meet the requirements for this layer. However, the basis for this assumption is not documented.

Response: see response to specific comments below.

SPECIFIC COMMENTS

Specific Comment 1. Page 2-3, Section 2.4a. This section states that an action leakage rate and response action plan will be established for the CAMU to address design flow rates in the leak detection system. This information, especially the action leakage rate, is not included in this document and needs to be provided.

Response: The action leakage rate is defined by EPA to be that leak rate associated with a 1 to 2 millimeter hole in the primary (top) liner, subject to low hydraulic heads on the order of an inch. The leakage rate for a hole this size under a head of 0.1 feet is approximately 30 gallons-per-acre-per-day. However, EPA proposes that an action

leakage rate of 5 to 20 gallons-per-acre-per-day should be used. Based upon a preliminary liner size of 210,000 square-feet, the action leakage rate for the CAMU proposed by EPA is in the range of 24 to 96 gallons-per-day. This range is less than the calculated peak daily leakage rate of 290 gallons-per-day (38.7 cubic-feet), shown in Table 3-7 of the design report. However, it is much more than the calculated average daily leakage rate of 2 gallons-per-day. The calculated peak daily leakage rate occurs during filling of the CAMU and assumes saturated soil is being placed. This is assumption does not accurately reflect the condition of the waste soils to be placed in the CAMU. Provisions will be added to the project specifications to protect the CAMU during precipitation events and to prevent wet soils from being placed in the CAMU. Under these circumstances, the higher end of the EPA proposed range, 96 gallons-per-day is suitable for use as the action leakage rate during and for some limited time after initial filling while the waste soils are consolidating. However, the lower end of the range, 24 gallons-per-day, is a more suitable action leakage rate for long-term monitoring of the CAMU. An operation, maintenance, and leak response action plan for the CAMU will be prepared and forwarded to EPA .

Specific Comment 2. Page 3-17, Section 3.4.1, 8th paragraph. This paragraph states that test results indicate that with proper compaction, a 20 percent increase in the density of the site soil should achieve the reduction in infiltration rate necessary to satisfy the required permeability of the compacted clay liner. These tests are not specifically referenced in this document and should be included as an appendix.

Response: The test results referenced on page 3-17 are referring to the nuclear density tests which established the in-situ density of the site soil, and the proctor tests that established the maximum density that can be achieved with compaction. The results of these tests are presented in Appendix C. This sentence doesn't mean to infer that tests have been conducted which conclusively demonstrate that once compacted, the soil permeability will satisfy EPA requirements for a compacted clay liner. Although efforts were made, the permeability of compacted site soils was too low to be measured using

standard laboratory permeability columns. Therefore, at this point the result of compaction on site soil permeability is a matter of some educated speculation. As shown on the attached Figure 3.15, even granular soils can experience a significant permeability reduction (up to two orders of magnitude) when compacted from a loose state to a compact state. As required by the project specifications, dual ring infiltrometer testing will be conducted on compacted soils in the field prior to construction to identify whether the desired permeability can be achieved through compaction. The pad for this testing will be constructed using actual field equipment and procedures. If 10^{-7} cm/sec permeability cannot be achieved through compaction, bentonite will be used as a soil amendment and additional testing will be conducted to ensure that EPA requirements will be attained.

The discussion in the text has been expanded to clarify this issue.

***Specific Comment 3.** Page 3-23, Section 3.6.1.2, 3rd paragraph. This section states that the increase in density associated with compaction of the clay liner (see Comment 2 above) is discussed in Section 3.3.1. Section 3.3.1 discusses surface water near the proposed landfill site. The cross-reference to the discussion on density should be corrected.*

Response: The reference has been revised to cite the expanded discussion relative to this issue in Section 3.4.1.

***Specific Comment 4.** Page 3-27, Table 3-8, Metals Concentrations in Waste Materials. Units of concentration should be added to this table.*

Response: The table has been revised as indicated

Specific Comment 5. Page 3-28, Section 3.6.2.2, 3rd paragraph. This section states that a pumping rate of 5 gallons per minute would be sufficient for leachate removal. The text is unclear if this pumping rate is equivalent to the action leakage rate (see Comment 1) discussed in Section 2.4a. The text should indicate if these pumping rates are the same.

Response: The reference will be revised to clarify that the 5 gallon-per-minute pumping rate is only meant to demonstrate that the average leakage rate calculated for the CAMU is so low (2 gallons-per-day) that it can easily be handled by a peristaltic pump for long-term monitoring purposes. The action leakage rate is explained in response to comment 1.

EPA COMMENT RESPONSE

ATTACHMENT 1

CITY OF EAST HELENA WELL ORDINANCE

ORDINANCE NO. 199

AN ORDINANCE PROHIBITING WATER WELLS FOR HUMAN OR OTHER
CONSUMPTION PURPOSES IN THE CITY OF EAST HELENA, MONTANA

WHEREAS, §§ 7-13-4401, et seq., MCA, gives cities the authority to engage in the water business, jurisdiction and control over the territory occupied by its public works, and the power to provide for clean water;

WHEREAS, the City Council of the City of East Helena, Montana, has an established water service area pursuant to Ordinance No. 183;

WHEREAS, the City Council of the City of East Helena, has determined that prohibition of water wells within the East Helena water service area to be in the best interests of the health and welfare of the community, as well as in the best interests of ensuring that the community maintains an economically stable and affordable water system.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF EAST HELENA, as follows:

Section 1. That a new section is hereby enacted as follows:

PRIVATE WATER WELLS PROHIBITED; DEFINITION; PENALTY.

(a) PROHIBITION. The drilling of a private water well or the reactivation of an existing, inactive private water well is prohibited within the water service area of East Helena.

(b) DEFINITION. A "water well" is defined as any digging, drilling, or excavation, by hand or by the use of machinery or equipment, whereby water is obtained from under the surface of the ground to be used on or above the ground surface for irrigation, manufacturing, commercial, noncommercial, human or other consumption purposes, regardless of whether or not such proposed use is potable.

(c) PENALTY. Any person convicted of a violation of any provision of this section shall be guilty of a misdemeanor, punishable by a fine not to exceed Five Hundred and no/100 Dollars (\$500.00) or by imprisonment for a period not to exceed six (6) months, or by both such fine and imprisonment.

Section 2. This ordinance shall be effective thirty (30) days after the date of its passage and approval.

First passed by the Council of the City of East Helena,
Montana, and approved by the Mayor, this 21st day of February,
1995.


Larry D. Moore, Mayor

ATTEST:


Garnet A. Dietrich, City Clerk

Finally passed by the Council of the City of East Helena,
Montana, and approved by the Mayor this 7th day of March, 1995.


Larry D. Moore, Mayor

ATTEST:


Garnet A. Dietrich, City Clerk

the records of said Lewis and Clark County; this grant is also subject to a certain deed dated January 18, 1901, recorded January 22, 1901, in Book 50 of Deeds at Page 402, of the records of said Lewis and Clark County; this grant is also subject to a certain agreement dated June 27, 1904, and recorded in Book 57 of Deeds, at Page 63, recorded June 27, 1904, records of Lewis and Clark County; subject further, to that certain reservation of undivided fifty percent (50%) interest in all mineral rights in and to said property by conveyance appearing of record; and hereby giving and granting unto Second Party, its successors and assigns, all water and water rights, ditches, flumes, reservoirs, aqueducts and privileges upon, connected with or usually had or enjoyed in connection with said described premises, including without limitation, those certain rights to seventy five inches (75") of water from Prickly Pear Creek first filed upon June 1, 1866, and , also, that certain right to thirty five inches (35") of water from Prickly Pear Creek first filed upon January 1, 1869. Deed Reference: Book 280, Page 572.

3. Commencing at a point in the northern boundary of the Northern Pacific Railway, which is also a point in the East side of the present County road crossing, from which point the quarter corner section former [sic] between Sections 30 and 31, T. 10 N., R. 2 W. bears N. 19° 30' W. 722 feet; thence northeasterly 417.4 feet to a point; thence southeasterly 417.4 feet to a point; thence southwesterly 408 feet to a point in the northern boundary of the right of way of the Northern Pacific Railway; thence northwesterly along the right of way fence of the Northern Pacific Railway on a curve of about 1,900 feet radius, 141 feet; thence northwesterly along said fence 276.5 feet to place of beginning, containing in all 3.985 acres, more or less. Deed Reference: Book 65, Page 196. (Ord. 183, 10-1-91)

8-3-7: PRIVATE WATER WELLS PROHIBITED; DEFINITION; PENALTY:

- A. Prohibition: The drilling of a private water well or the reactivation of an existing, inactive private water well is prohibited within the water service area.
- B. Definition: A "water well" is defined as any digging, drilling, or excavation, by hand or by the use of machinery or equipment, whereby water is obtained from under the surface of the ground to be used on or above the ground surface for irrigation, manufacturing, commercial, noncommercial, human or other consumption purposes, regardless of whether or not such proposed use is potable.

- C. . Penalty: Any person convicted of a violation of any provision of this Section shall be guilty of a misdemeanor, punishable by a fine not to exceed five hundred dollars (\$500.00) or by imprisonment for a period not to exceed six (6) months, or by both such fine and imprisonment. (Ord. 199, 3-7-95)

2.4 GROUNDWATER

Groundwater quality in the plant site area is variable by location and reflects the effects from previously identified source areas. Historically, groundwater on the east half of the plant site is strongly influenced by long-term water quality trends in Lower Lake. Water quality trends on the west half of the plant site have been influenced by the Former Acid Plant Water Treatment Facility and Sediment Drying Area, the Former Speiss Pond and Pit, and the Lower Ore Storage Area.

Overall groundwater quality on the East Helena plant site is depicted in Figures 2-4-1 through 2-4-4. These figures (taken from the CC/RA) are isocontour plots of arsenic, cadmium, lead, and zinc for fall 1997 data sets and show:

- Arsenic concentrations in shallow groundwater exceed the 0.050 mg/L MCL on the plant site and in a limited area downgradient of the plant site. Groundwater arsenic concentrations also exceed the State of Montana's WQB-7 human health based standard of 0.02 mg/L. The highest concentrations of arsenic in groundwater originate from the Speiss Handling Area (former Speiss Pond and Granulation Pit area), the Acid Plant area and the former Acid Plant Sediment Drying Pad.
- Cadmium and lead concentrations in groundwater are elevated within the immediate plant site area, but remain at or below the limits of detection in East Helena area monitoring wells. Metals concentrations (cadmium, lead, and zinc) are all currently below MCLs in all downgradient wells.
- Low or trace concentrations of organic constituents have been detected in soils and groundwater on the west plant site. There are generally no detectable volatile organics and only low or trace concentrations of semi-volatile acid and base/neutral compounds that are typical of remnants from heavier fuel oils. These organic constituents are presumed to originate from historic spills and/or equipment leakage.

Arsenic has been identified as the primary constituent of concern since it is detected in off-site shallow monitoring wells at concentrations in excess of drinking water standards. Arsenic is not elevated in the intermediate and deep aquifers beneath East Helena. Former residential wells in East Helena are primarily completed in the intermediate and deep aquifers. Water at these wells meets water quality standards (with the exception of the St Clair well which is a shallow, hand-dug well). The private wells in East Helena are no longer in use as potable water supply wells, because the City of East Helena has implemented a well ban in the area serviced by the municipal water supply. Asarco monitors water quality semi-annually in the private wells and monitoring wells in East Helena. Semi-annual monitoring results show the arsenic plume has advanced very little since the RI period (ten years) due to processes of natural attenuation in downgradient areas. An exception is well EH-60, located just north of the plant site, where arsenic concentrations have continued to increase.

Other downgradient areas show little or no change, apparently due to seepage effects from Prickly Pear Creek and a corresponding increase in the oxidation state of groundwater. For example, there is a five-fold increase in dissolved oxygen concentrations between EH-60 and EH-62 and a corresponding decrease in arsenic concentrations. The decrease in arsenic concentration is coincident with a change from arsenic (III) dominant to arsenic (V) dominant conditions, large decreases in iron and manganese concentrations, and increases in dissolved oxygen concentrations. This is indicative of removal of arsenic by coprecipitation/adsorption with hydrous iron oxides/hydroxides in response to the increasing oxidation state in groundwater.

alternatives that considers their effectiveness as interim measures, technical feasibility, administrative feasibility and approximate costs. Based on this evaluation, the subsequent sub-sections of 3.3 provide additional detail on the proposed interim measures for stockpiled sediments and soils. The additional data and investigation requirements to develop, design and implement the selected interim measures are also described.

As described in the CC/RA report, corrective action options for the Lower Lake sediments and other stockpile soils consist primarily of construction of a Corrective Action Management Unit (CAMU) for storage and containment. A design report for a CAMU was prepared (Hydrometrics 1997a) that presented an engineering evaluation and a conceptual design. A refinement of this design report is presented in Volume II of this Work Plan. The elements of the CAMU design are summarized below. Although fairly advanced, the design requires refinement because the total volume of materials needed for containment is not yet known. In particular, the volume associated with soils in Shew Ridge soils requires characterization to provide the data to complete the CAMU design (see Section 4.3).

The primary containment tank, secondary containment system, input runoff-conveyance drains, and a perimeter trough drain (see Figure 4-1-3) will be evaluated during a dry period (mid-late summer) when there are no inputs (runoff or direct infiltration) to the system. The evaluation will consist of the following steps:

1. The primary tank, secondary containment system, runoff input drains, and perimeter runoff trough drains will be drained of existing water, and thoroughly cleaned using the plant vacuum truck to remove sediment. Any sediment removed from the containment tanks and drains will be managed as Asarco has established for routine maintenance and cleaning of these facilities. The speiss sediments will be placed on the concrete scrubber pad where any residual water will decant to a concrete lined containment sump. The decant water will then be routed to the HDS water treatment plant. The remaining speiss solids will be removed from the concrete scrubber pad using a front end loader and transferred to the direct smelt building where the speiss will be mixed with other direct charge material and placed in the blast furnace for metals recovery.
2. After the primary tank, secondary containment system and associated sump are drained and cleaned, one to two feet of clean water will be added to the primary tank and visually monitored for a 5-day period for leaks from the bottom of the primary tank to the secondary containment tank. It is assumed that water losses from the sides of the tank would be visually obvious during routine operation and this possibility will not be tested.
3. Water levels in the secondary containment system will be measured daily for a 5 day period. Coincident with water level measurement, an on-site evaporation pan will also be measured to compensate for losses by evaporation in the second containment during the evaluation period.
4. Leakage to the secondary containment from runoff input piping to the primary tank obviously occurs based on preliminary visual inspection. The runoff input piping will be cleaned of sediment and thoroughly inspected to determine what repairs are needed to eliminate leakage to the secondary containment.
5. Twenty foot sections of the perimeter runoff trough drain outside of the secondary containment will be isolated using rectangular fiber glass or plastic sheet inserts as shown in Figure 4-1-4. The insert sheets will be sealed with silicone sealant to provide a water-tight seal. After installation, the isolated sections will be filled with water and monitored over a 24-hour period to measure any water level declines that may occur.

TABLE 4-1-1. ANTICIPATED CONSTRUCTION FOR MONITORING WELLS INSTALLED DURING INTERIM MEASURES

Location	Well Name	Casing Size (inches)	Area of Evaluation	Approximate Ground Surface Elevation (feet)	Approximate Static Water Level (ft bgs)	Anticipated Total Depth (feet)	Total Depth Elevation (feet)	Anticipated Screen Interval (ft bgs)
Speiss Handling Area	DH-30	2	Upgradient (south) of Speiss Granulation Pit	3909	13	21	3888	11-21
	DH-31	2	Downgradient (north) of Dross Plant within former Speiss Pond	3909	20	28	3881	18-28
	DH-32	2	Downgradient (northwest) of Dross Plant	3907	22	30	3877	20-30
	DH-33	2	Downgradient (northwest) of Dross Plant	3909	22	30	3879	20-30
	DH-34	2	Downgradient (northwest) of Dross Plant	3910	20	28	3882	18-28
	DH-35	2	Downgradient (north) of Dross Plant	3906	20	28	3878	18-28
	DH-36	2	Downgradient (north) of Administrative Office Building	3907	24	32	3875	22-32
	DH-37	2	Downgradient (north) of former Speiss Granulating Pit	3909	13	21	3888	11-21
	DH-38	2	Downgradient (north) of Dross Plant Baghouse	3907	22	30	3877	20-30
Acid Plant Area	DH-39	2	Southwest of Acid Plant	3921	15	23	3898	13-23
	DH-40	2	Immediately downgradient (north) of Acid Plant	3920	14	22	3898	12-22
	DH-41	2	Downgradient (north) of Ore Storage and adjacent to sump	3918	14	22	3896	12-22
	DH-42	2	Downgradient (north) of Clarifier Building	3920	24	32	3888	22-32
	DH-43	2	Downgradient (north) of Sinter Plant Baghouse	3920	24	32	3888	22-32
	DH-44	2	Upgradient (south) of Acid Plant	3920	14	22	3898	12-22
Acid Plant Sediment Drying Area	DH-45	2	Downgradient (north) of former Sediment Drying Area	3918	15	23	3895	13-23
	DH-46	2	Downgradient (north) of former Sediment Drying Area	3918	15	23	3895	13-23
	DH-47	2	Downgradient (north) of former Sediment Drying Area	3918	15	23	3895	13-23
Plant Site North Boundary Area	DH-48	2	Downgradient of plant site- northwest of plant	3899	29	37	3862	27-37
	DH-49	2	Downgradient of plant site- northwest of plant	3897	29	37	3860	27-37
	DH-50	2	Downgradient of plant site- northwest of plant	3897	29	37	3860	27-37
	DH-51	2	Downgradient of plant site- northwest of plant	3897	29	37	3860	27-37
	DH-52	2	Downgradient of plant site- north of slag pile	3885	6	18	3867	8-18
	DH-53	2	Downgradient of plant site- north of slag pile	3885	6	18	3867	8-18
	DH-54	2	Downgradient of plant site- north of Hwy 12, east of well EH-60	3885	29	37	3848	27-37

Note: Listed casing size is inside diameter.

ft bgs = feet below ground surface

Elevations in feet above mean sea level

All wells will be completed in the shallow alluvial aquifer.

TABLE 4-1-3. INTERIM MEASURES SOIL SAMPLE COLLECTION AND ANALYSIS MATRIX

Sample Location	Purpose	Sample Types and Depth Intervals ⁽¹⁾	Number of Sampling Events	Total Non-QC Samples	Analytical Parameters ⁽²⁾	Laboratory Methods	Project Detection Limit Goal	Field QC	Total Samples
								Field Duplicates ⁽³⁾	
<u>Monitoring Well Boreholes</u> DH-30 through DH-38	Characterize unsaturated and saturated zone soil chemistry in Speiss Handling area	Continuous 2' split spoons to 12', 5' intervals from 15' to total depth	1	86	As Cd Cu Fe Mn Pb Zn	XRF XRF XRF XRF XRF XRF	10 ppm 10 ppm 10 ppm 20 ppm 30 ppm 10 ppm 10 ppm	13	256
DH-39 through DH-44	Characterize unsaturated and saturated zone soil chemistry in Acid Plant area	Continuous 2' split spoons to 12', 5' intervals from 15' to total depth		56					
DH-45 through DH-47	Characterize unsaturated and saturated zone soil chemistry in Acid Plant Sediment Drying area	Continuous 2' split spoons to 12', 5' intervals from 15' to total depth		27					
DH-48 through DH-54	Characterize unsaturated and saturated zone soil chemistry along north plant site boundary	Continuous 2' split spoons to 12', 5' intervals from 15' to total depth		74					
XRF Subtotal:									256
<u>Shew Ridge Boreholes</u> (SR-1 through SR-22)	Define vertical concentration profiles in stockpile along west edge of plant site	1.5' split spoons continuous to depth (17 samples per borehole)	1	374	As Cd Cu Pb Zn	XRF XRF XRF XRF	10 ppm 10 ppm 10 ppm 10 ppm	19	393
<u>Shew Ridge Test Pits</u> (TP-1 through TP-12)	Define lateral extent of stockpile sloughing	2' composites 6' total depth 3 samples per pit	1	36				2	38
XRF Subtotal:									431
<u>Selected Shew Ridge Borehole and Test Pit Samples</u>	Determine toxicity characteristic of Shew Ridge stockpile soils using TCLP leach test	Soil samples from Shew Ridge boreholes and test pits, selected based on XRF results (2-3 samples per borehole, 1-2 samples per test pit)	1	92 ⁽⁴⁾	TCLP As TCLP Ba TCLP Cd TCLP Cr TCLP Pb TCLP Hg TCLP Se TCLP Ag	EPA 1311/6010 ⁽⁵⁾ EPA 1311/6010 ⁽⁵⁾ EPA 1311/6010 ⁽⁵⁾ EPA 1311/6010 ⁽⁵⁾ EPA 1311/6010 ⁽⁵⁾ EPA 1311/7470 ⁽⁵⁾ EPA 1311/6010 ⁽⁵⁾ EPA 1311/6010 ⁽³⁾	0.05 mg/L ⁽⁶⁾ 1.0 mg/L ⁽⁶⁾ 0.01 mg/L ⁽⁶⁾ 0.05 mg/L ⁽⁶⁾ 0.05 mg/L ⁽⁶⁾ 0.002 mg/L ⁽⁶⁾ 0.01 mg/L ⁽⁶⁾ 0.05 mg/L ⁽⁶⁾	5	97 ⁽⁴⁾
TCLP Subtotal:									97

(1) Sample depths are approximate; actual depths will be based on field conditions. Number of samples calculated assuming monitor well borehole depths are as listed in Table 4-1-1 of the IM Work Plan, Shew Ridge stockpile boreholes are 25' total depth.

(2) All stockpile samples from the Lower Ore Storage Area and the area between Upper and Lower Lakes will be analyzed for both total and TCLP metals.

(3) Duplicates will be collected at a minimum frequency of 1 per 20 field samples. Duplicates for Shew Ridge TCLP analysis will be submitted at a frequency of 1 per 20 samples selected for TCLP.

(4) Shew Ridge samples will be submitted for TCLP analysis based on XRF results (approximately 2-3 samples per borehole and 1-2 samples per test pit are anticipated).

(5) Method 1311 is the TCLP extraction method; Methods 6010 and 7470 are analytical methods to be performed on extracts (both methods from SW-846 - Test Methods for Evaluating Solid Waste, EPA, 1992).

(6) Detection limits for TCLP analysis have been set at 100x below regulatory limits.

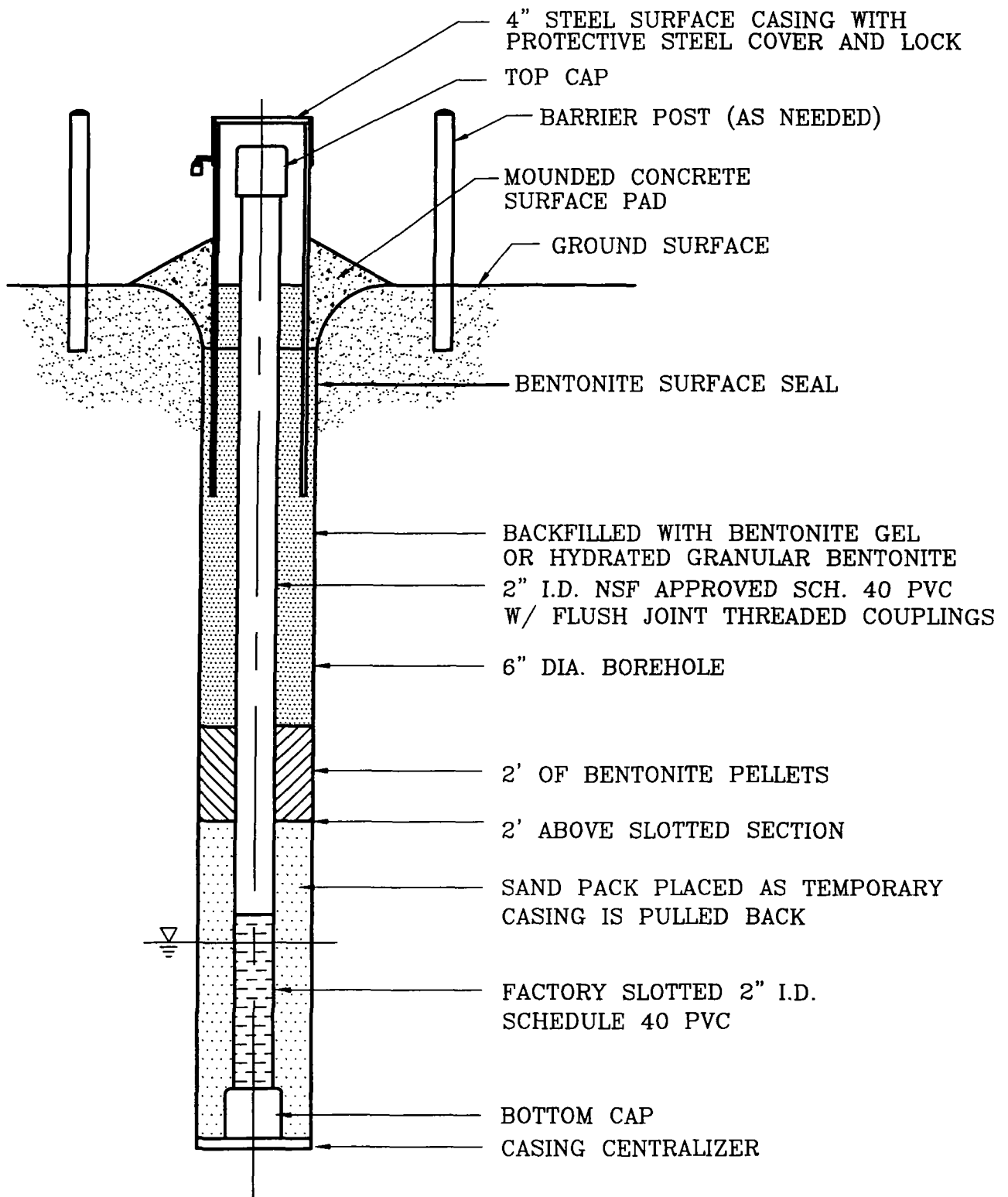
professional judgment. All samples will be collected, handled, and shipped to the laboratory in accordance with the Quality Assurance Project Plan (QAPP) in Section 4.0.

Monitoring wells will be completed with 2-inch schedule 40 polyvinyl chloride (PVC) casing with flush joints and threaded couplings. Water bearing intervals will be screened with 0.010 factory slot screen, 2-inch schedule 40 casing, and sand packed and grouted to meet Montana monitoring well standards. Each well will be completed with a 10-foot screen, with the upper one to two feet of the screen placed across the observed water table. Monitoring well completion will be supervised by a licensed Montana monitoring well constructor. Following completion, monitoring wells will be developed using air surging, submersible pump or a bailer to reduce turbidity, and to ensure good hydraulic continuity with the aquifer. Monitoring well construction details for proposed shallow alluvial wells are shown in Figure 4-1-6.

Following drilling and development, all monitoring wells will be surveyed vertically and horizontally. An elevation in feet above mean sea level (MSL) for the top of the casing (TOC) measuring point (MP) will be determined for each well so that the monitoring well network is referenced to a common datum. Depths to groundwater will be measured from the TOC measuring point, and static groundwater levels will be converted to elevations in feet above mean sea level.

Monitoring Well Sampling

Groundwater sampling will be conducted at each monitoring well following well completion and development. An analytical parameter list for groundwater analysis is in Table 4-1-4, and a groundwater sample collection and analysis matrix is shown in Table 4-1-5. Groundwater samples will also be collected from selected existing monitoring wells to provide additional data for groundwater plume definition and identification of potential contaminant sources.



NOT TO SCALE

ASARCO INCORPORATED
INTERIM MEASURES WORK PLAN
EAST HELENA FACILITY
EAST HELENA, MONTANA

TYPICAL SHALLOW MONITORING WELL CONSTRUCTION

FIGURE
4-1-6

In addition to groundwater sampling, specific conductance (SC), pH and groundwater levels will be continuously monitored over a period of several months at a selected speiss area monitoring well to examine water quality fluctuations in relation to plant site operations.

The monitoring well will be chosen based on water quality data obtained from interim measures groundwater sampling, and specific conductance and groundwater levels will be continuously monitored using an electronic data logger. Water quality fluctuations will be correlated with plant site operations in the Speiss Handling Area which will include:

- speiss collection tank draining or filling;
- dust control suppression in the Speiss Handling Area;
- significant ore and speiss handling events;
- any spills or leaks;
- precipitation events; and
- video logs of the area activities.

Aquifer Testing

Aquifer testing will be conducted on new monitoring wells to estimate horizontal hydraulic conductivity and aquifer transmissivity. The tests will be conducted by performing a “slug test” at each well. The slug test will be performed by instantaneously lowering a 1 1/4-inch diameter, 10-foot-long solid PVC rod (slug) into the well and continuously monitoring the falling water level (falling head test) in the well bore. Water levels will be monitored using a pressure transducer and electronic data logger.

After the water level in the well returns to a static condition, a rising head test will be performed by instantaneously removing the slug from the well and continuously monitoring the rise in water level in the well bore. Data from each test will be stored on the data logger and later downloaded to computer for data reduction and analysis. The pressure transducer and slug will be decontaminated after each well test with a soap solution and rinsed with deionized water to prevent cross contamination between wells. Rising head tests will be conducted in all wells, and falling head tests will be conducted in wells screened below the water table.

Section 3.1.1.1. Proposed monitoring well construction details are in Table 4-1-1. Subsurface soil sample intervals are summarized in Table 4-1-3. Soil and groundwater analytical parameters and detection limits are shown in Tables 4-1-2 and 4-1-4, respectively. Additional details are provided in the QAPP in Section 4.0 and in Appendix A.

Slug tests will be conducted at each of the monitoring wells to provide a preliminary assessment of hydrologic characteristics. Slug test protocol is described in Section 3.1.1.

Air Sparging Pilot Test

A site along the plant site north boundary with favorable geology and geochemistry will be selected for an air sparging pilot test. The test will introduce oxygen into the shallow aquifer with the goal of increasing the overall groundwater oxidation potential. The effectiveness of air sparging on modifying redox potential in the shallow aquifer will be evaluated by measuring key geochemical constituents upgradient and downgradient of the sparge well. Monitored parameters will include at a minimum:

- dissolved oxygen;
- ferrous iron (Fe^{2+}); and
- arsenic speciation ($\text{As}^{3+}/\text{As}^{5+}$);
- pH.

The specific monitoring requirements will depend on site data collected during the well installation phase of this investigation, and will be finalized in consultation with EPA prior to initiating the test. The air sparging test will be conducted over a one to two month period. However, the actual duration may vary depending on test results.

4.1.2.2 Assessment and Implementation of Migration Controls (GW-5B)

While there is some potential for application of migration control alternatives as interim measures there are presently insufficient data to evaluate their potential effectiveness and implement these alternatives. Additional monitoring well data from the northern plant site boundary and areas downgradient from specific source areas will provide the data

necessary to assess whether specific redox controls (or localized groundwater capture) have the greatest potential for application at specific locations. Based on the results of these data, as well as the results from source control actions, an air sparge testing program (Alternative GW-5B) will be developed to provide a basis for assessing the effectiveness of redox measures (see Figure 4-1-10).

Ultimately the application of migration controls will be contingent upon the effectiveness of additional interim measures for groundwater source control. As described in Sections 4.1 above and 4.2 below, there is potential for additional source control measures to achieve water quality improvements on the plant site in the short-term. As described in the CC/RA report, past source control measures have improved the overall water quality at the plant site. Based on preliminary site review, additional source controls can be developed and implemented as interim measures and monitored for immediate or short-term effects. This would allow refinement of the migration control measures in response to the effects of source control measures.

4.1.2.3 Application of Interim Measures to East Helena Groundwater

Arsenic concentrations in shallow groundwater decline by several orders of magnitude near the plant site boundary, but are still above the human health standard beneath portions of East Helena. The proposed interim measures address arsenic in East Helena area ground water through load reductions in source areas and upgradient migration controls on the plant site boundary.

Because of area conditions, direct measures in the city of East Helena would not be effective in reducing or eliminating the portion of the arsenic plume located in the city of East Helena. For example, direct recovery of groundwater beneath East Helena would not reduce arsenic concentrations while the upgradient sources of arsenic loading remain. Because of an induced steeper gradient than present conditions, direct groundwater recovery in the City of East Helena has a significant potential to draw even higher concentrations of arsenic and metals into East Helena from the plant site. Similarly, the use of air sparging in the city of East Helena would have limited effectiveness because

arsenic in groundwater is already in the process of being converted to an oxidized state beneath East Helena due to effects from Prickly Pear Creek. These redox processes are already effectively stabilizing the arsenic plume and preventing migration to other outlying areas. The proposed interim migration controls target the area along the north plant boundary, and will attenuate the source of arsenic to East Helena groundwater. In addition, placement of migration controls along the north boundary of the plant site allows flexibility in location and placement of the control points. This flexibility could not be achieved in the city of East Helena because of limitations on property access, existing land use and traffic concerns.

4.2 ACID PLANT

EPA has concerns about the Acid Plant, due to its age and the number of releases it has experienced over the past two years. EPA states that "Releases of acid are a particular concern for two reasons. First releases of the acid may mobilize existing subsurface contamination; and second high concentrations of lead, arsenic, and mercury can be found in the acid." While acids have the potential to mobilize arsenic and metals in subsurface soils, neither arsenic nor metals are present at significant concentrations relative to groundwater and soil. Arsenic and metals are present in the scrubber water circuit in the Acid Plant Area, but the scrubber circuit has been responsible for only one of the recent releases.

This work plan addresses containment and spill reduction measures for the acid circuit, the scrubber water circuit and the cooling water circuit. This includes:

1. Identification of areas requiring additional containment measures and a proposed schedule for implementation.
2. Identification and implementation of interim measures that will reduce the number and quantity of leaks and spills in the acid plant area.

Figure 4-2-1 shows a process schematic for development, design and implementation of spill reduction and containment measures for the acid plant area. As described above,

these actions would be implemented as plant operating and maintenance actions, and may be supplemented by additional interim measures for groundwater source control in the acid plant area.

4.2.1 Proposed Spill Reduction Interim Measures

Table 3-1-2 includes a list of potential interim measures for the Acid Plant Area. Interim measure alternatives for the acid plant area are broken into spill reduction (conveyance lines, heat exchangers, and plate coolers) and spill containment (grading, pavement, and neutralization).

4.2.1.1 Conveyance Lines (AP-1 A)

A number of the spills that occurred in the Acid Plant area over the past two years can be attributed to failures in the original sulfuric acid process pipeline. In 1998, Asarco began replacing the major acid transfer lines which are approximately 20 years old. Any remaining sections of this system which have not been replaced will be replaced in 1999.

4.2.1.2 Operation and Maintenance Plan (AP-1B)

A revised operation and maintenance plan (Table 3-1-2, AP-1B) will be developed for all plumbing associated with the acid plant and its facilities. At a minimum, the plan will include:

- An inventory of all lines, installation dates, and record of previous inspection.
- Development of a schedule to repair/replace portions of the system prior to failure.

Additional soil quality data will also be obtained from the Shew Ridge soil stockpile. Shew Ridge is an L-shaped soil stockpile that is approximately 1000 feet in length, and varies in height from 10 feet high on each end to over 30 feet high over most of its length. Soil quality on Shew Ridge will be characterized by collecting split spoon samples on 50-foot centers from approximately 22 boreholes along the crest of the ridge. Borehole sampling will consist of continuous split spoon sampling to total depth. Total depth for borehole sampling is anticipated to be approximately 25 feet below ground surface.

Soil samples will also be collected from Shew Ridge soils with a backhoe from 12 test pits along the sides of the ridge. Test pit samples will consist of 2-foot composite samples to a total depth of 6 feet bgs. Procedures for split spoon and test pit sampling are described in the QAPP in Appendix A.

Shew Ridge soil samples will be analyzed for concentrations of arsenic and six metals (Cd, Cu, Fe, Mn, Pb, Zn) by XRF methods, and selected samples will also be tested by TCLP (Toxicity Characteristic Leaching Procedure) methods. Table 4-1-3 shows the soil sample collection and analysis matrix for Shew Ridge soil samples, and the approximate location of boreholes and test pits is shown in Figure 4-3-2. Analytical parameters and laboratory detection limits for soil analysis are in Table 4-1-2.

Volume estimates and soil quality data will be used to finalize the capacity requirement for the CAMU.

4.3.2 CAMU Design Summary

Asarco requested, pursuant to 40 CFR 264.552, Environmental Protection Agency (EPA) designation of the area described below at its East Helena, Montana plant as a Corrective Action Management Unit (CAMU). The proposed CAMU landfill would, as shown in Figure 4-3-3, contain a design volume of 65,650 cubic yards of metal-containing soil and construction debris. Final design is contingent on characterization of the soil stock piles. The soil and debris were generated from Superfund (CERCLA) remediation activities at

matter from stationary sources shall not exceed 20% averaged over 6 consecutive minutes.

- b) **ARM 17.8.220 Ambient air quality standard for settled particulate matter.** Particulate matter concentrations in the ambient air must not exceed 10 grams per square meter for a 30-day average.
- c) **ARM 17.8.223 Ambient air quality standards for PM-10.** PM-10 concentrations in the ambient air must not exceed the 24-hour average of 150 micrograms/cubic meter of air; and an annual average of 50 micrograms/cubic meter of air.
- d) **ARM 17.8.222 Ambient air quality standard for lead.** Lead concentrations in the ambient air must not exceed the 90 day average of 1.5 micrograms/cubic meter.
- e) **ARM 17.8.304 Visible air contaminants.** Emissions to be discharged into the outdoor atmosphere must not exhibit an opacity of 20 percent or greater averaged over six consecutive minutes.

4.3.3.4 Montana Water Quality Act and Controlled Groundwater Areas

State waters, protected by the Montana Water Quality Act, Mont. Code Ann. 75-5-103 et seq., include surface or underground water. Construction and operation activities for the proposed CAMU do not include the discharge of water or pollutants to any surface or groundwater. The state requires an MPDES General Discharge Permit for Storm Water Associated with Construction Activity (GDPSW) if a construction project exceeds 5 acres. A GDPSW may be required during construction of the CAMU since the fenced area where construction activities will be taking place is greater than 5 acres. Storm water runoff from the completed CAMU will discharge to an infiltration/evaporation basin sized to contain the 10yr 24 hr event and therefore the Montana MPDES permitting regulations are not applicable to the completed

CAMU. There is no body of surface water affected by the proposed CAMU. Stormwater will be controlled onsite using Best Management Practices, and Asarco will review its Stormwater Pollution Prevention Plan to determine if an amendment is appropriate.

Groundwater is located under the CAMU area and will be protected and monitored according to EPA's federal requirements for the CAMU. These requirements will also ensure compliance with the applicable state requirements. The following Montana water quality regulations are applicable to the proposed CAMU:

- a) **ARM 17.30.1003 Ground Water Quality Standards.** This regulation sets forth the standards applicable to groundwater and the classification of state groundwater. Incorporated by reference is MDEQ's Circular WQB-7 (Nov. 1998), effective January 15, 1999.
- b) **Mont. Code Ann. 85-2-506 Controlled groundwater areas.** This statute provides for the designation of a controlled groundwater area by the Montana Department of Natural Resources to protect against excessive groundwater withdrawals causing contaminant migration. There is currently no plan for a controlled groundwater area at the proposed CAMU location, but this Montana statute is applicable to the state's groundwater.

It is anticipated that leachate generated from the CAMU, if any, will be a very small amount. The amount of leachate could vary depending on the weather conditions during placement. The model that has been used to predict leachate volumes assumes the material being placed in the CAMU is wet, and therefore, is conservative in its leachate volume estimates. Placement of materials in the CAMU will be scheduled during dry weather to minimize the potential for generating leachate. However, the predicted leachate volumes for wet material are still small enough to be manageable through treatment in the plant water treatment system or shipment to an off-site disposal facility. The predictive model will be further refined for water

management purposes after additional materials characterization has been conducted. The leachate will be appropriately managed after the quality and quantity is determined. At this time, it is anticipated that no state permit will be required for the leachate.

4.3.3.5 Montana Safety Act and Montana Occupational and Health and Safety Requirements.

- a) **Sections 50-71-201, 50-71-202, and 50-71-203, MCA.** Employers must provide a safe work place for employees and shall furnish and use and require the use of safety devices and safeguards. No person shall remove, displace, damage, destroy, carry off or refuse to use safety devices or safeguards.
- b) **Section 50-71-322, MCA Procedure for worker to report safety violation.**
This section provides for workers notifying their employer or MDEQ of safety regulation violations.
- c) **Section 50-78-201 through 203, MCA.** Employers must provide a safe work place for employees.
- d) **ARM 17.74.101 Occupational noise.** In accordance with this section, no worker shall be exposed to noise levels in excess of the levels specified in this regulation. This regulation is applicable only to limited categories of workers and for most workers the similar federal standard in 29 CFR § 1910.95 applies.
- e) **ARM 17.74.102 Occupational air contaminants.** The purpose of this rule is to establish maximum threshold limit values for air contaminants under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. In accordance with this rule, no worker shall be exposed to air contaminant levels in excess of the threshold limit values listed in the regulation. This regulation is applicable only to limited categories of workers, and for most workers the similar federal standard in 29 CFR § 1910.1000 applies.

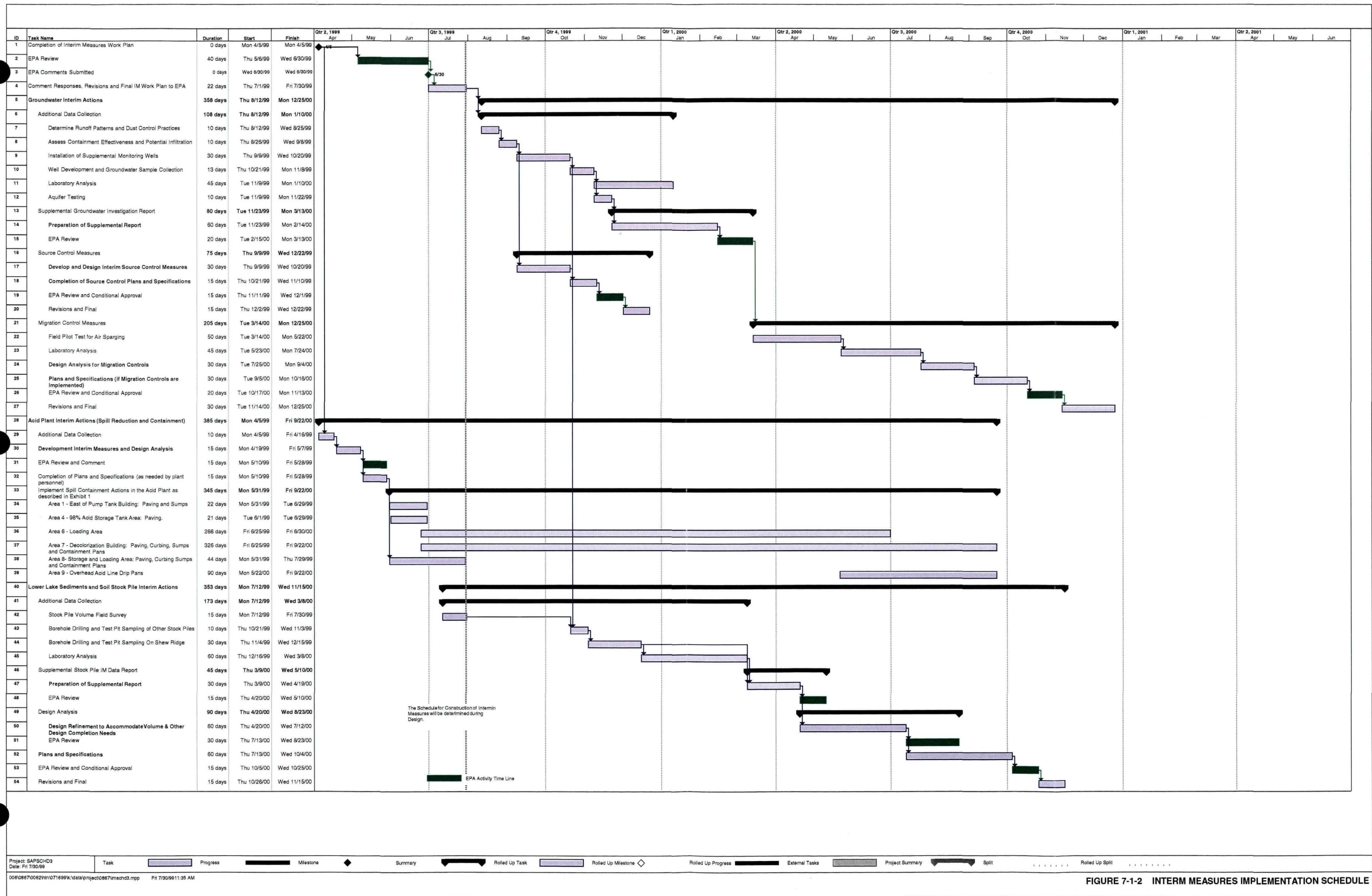


FIGURE 7-1-2 INTERM MEASURES IMPLEMENTATION SCHEDULE